



TPCP

Tobacco Prevention & Cessation Program

Electronic Cigarettes

Report Prepared By
Tariq Ali, MD, MPH

Contributors
Carolyn Dresler, MD, MPA

March 14, 2011

INTRODUCTION

The electronic cigarette, also called the e-cigarette, was invented in 2003 by a Chinese pharmacist, Hon Lik, who used to work for the company named Golden Dragon Holdings. The product was released in the Chinese market the following year. In 2005-2006 the product was marketed beyond the frontiers of China. Later the name of the company was changed to Ruyan Holdings ("Ruyan" in Chinese means "to resemble smoking").¹ There are numerous other brands on the U.S. market at present.

BASIC STRUCTURE AND FUNCTIONALITY

An electronic cigarette (e-cigarette) is a battery-operated device that provides inhaled doses of nicotine vaporized solution. It is an alternative to smoked tobacco products such as cigarettes, cigars, or pipes. In addition to the nicotine, the solution is available in several flavors², for example, mint, cherry, vanilla, caramel, and coffee. The nicotine solutions that are sold separately for use in refillable cartridges are sometimes referred to as "e-liquid" or "e-juice," and consist of nicotine dissolved in propylene glycol (PG) or in diethylene glycol depending on the manufacturer's preference.²

The e-cigarette resembles an elongated tube, although many are designed to resemble the outward appearance of real smoking products such as cigarettes, cigars, and pipes. Another common design is the "pen-style;" so named for its visual resemblance to a ballpoint pen. Most electronic cigarettes are reusable devices with replaceable and refillable parts and cartridges. A number of disposable electronic cigarettes have also been developed.

There are two kinds of e-cigarettes available in the market - automatic and manual. In automatic models, during inhalation the device's air flow is detected by a sensor that activates a heating element (atomizer) that vaporizes a liquid solution stored in the mouthpiece that contains nicotine.³ In the manual models, the user must control the device by pressing a button to activate the heating element to produce vapor which is then inhaled by the user. On most models (Fig. 1) a Light Emitting Diode (LED) light on the opposite end of the device is also activated during inhalation - this serves as an indicator of use. Most electronic cigarettes employ a lithium-ion rechargeable battery to power the heating element. Battery life varies depending on the battery type, size, frequency of use and operating environment. There are different battery charger types available, for example, wall outlet, car, and USB chargers.

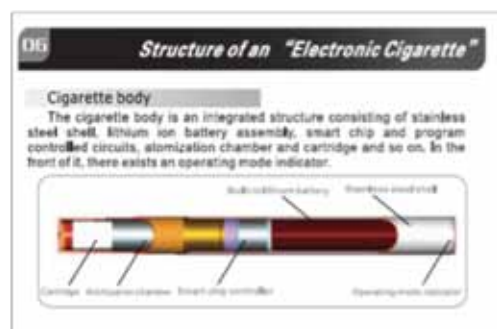


Figure 1

In 2009, the U.S. Food and Drug Administration (FDA) announced that through the laboratory analysis of electronic cigarette solution samples, it was determined they contained carcinogens including nitrosamines, toxic chemicals such as diethylene glycol (a component of antifreeze) and tobacco-specific metabolites (such as anabasine, myosmine and beta-nicotyrene) that are harmful for human consumption. At this time the agency has no way of knowing, except for the limited testing it has performed, the levels of nicotine or the amounts or kinds of other chemicals that the various brands of these products deliver to the user. Tests indicated that these products contained detectable levels of known carcinogens and toxic chemicals to which users could potentially be exposed.

In January 2010, the FDA classified the electronic cigarette as a drug delivery device and it was accordingly subjected to the marketing approval prior to sale under the Food Drug and Cosmetic Act (FDCA). However, the aforementioned classification was overruled by Federal Judge Richard J. Leon citing the device should be regulated as a tobacco product rather than a drug or medical product. The verdict culminated in preventing FDA from banning e-cigarette imports. The FDA argued that the right to regulate electronic cigarettes based upon their previous ability to regulate nicotine replacement therapies such as nicotine gum or patches should be entrusted to them. Although the FDA's appeal may yet result in e-cigarettes classification as a "drug delivery devices" they may eventually be classified under the new FDA tobacco jurisdiction because of their derivation from and similarity to other tobacco products.⁴

There is very limited information available regarding e-cigarette users, their opinions and related issues. While initially e-cigarettes were mainly used as smoking cessation devices, regulators and tobacco control experts are now concerned about the safety, and potential toxicity.⁵ There are limited published studies available on the safety and toxicity of e-cigarettes; therefore, more research is required.⁵ Electronic cigarettes are available online and at retail stores around all 50 states, as well as more than 25 countries worldwide.⁶ Electronic cigarette marketing websites are increasing day by day, and there is a rapid increase in virtual user communities.⁷

Researchers have reported that e-cigarette packages lack information on the product contents, usage or warnings, not to mention the e-cigarette cartridges could leak and expose others, such as children to nicotine.⁸

REGULATORY EFFORTS

The states of New Jersey, New Hampshire, New York, and Pennsylvania have begun efforts to restrict electronic cigarette use in various forms. The state of Arizona is planning to put a ban on selling electronic cigarettes to minors.⁹ In Washington state, the King County Board of Health has banned smoking of electronic cigarettes in public places and prohibited sales to minors,¹⁰ and on February 9, 2011, commissioners of Spokane County voted against the sales of electronic cigarettes to minors.¹¹ Recently, U.S. Department of Transportation prohibited the use of electronic cigarettes on airplanes and plans to issue an official ban soon.¹²

Internationally, China, United Kingdom and South Korea have legalized the sales of e-cigarettes. In New Zealand, Denmark, and Norway, prescription/authorization is needed to obtain e-cigarettes or cartridges. In Brazil, electronic cigarettes sales, importation or advertisement of any kind are forbidden. In Canada, as of March 2009, imports, sales, and advertising of nicotine containing electronic cigarettes have been banned. Health Canada also advised Canadians not to purchase or use any electronic smoking products.¹³ In Singapore, it is illegal to sell, import or use any e-cigarettes.

CONCLUSIONS & RECOMMENDATIONS

The electronic cigarettes, or e-cigarettes, are not regular cigarettes but are devices that may be loaded with nicotine-filled cartridges. Although most of the electronic cigarette manufacturers claim their products are tobacco-free, health care providers and consumers must remember that inhaled nicotine is highly addictive.

The general public perception that e-cigarettes are smoking cessation aids has to be changed.⁶ This issue needs to be addressed by health care providers by emphasizing the goal to stop or prevent smoking rather than to seek an unproven alternative that may delay the smoker's desire to quit or encourage the initiation of smoking behavior the product is perceived as a safer alternative to regular cigarettes. In addition, the technology, easy accessibility, and availability of numerous flavors of nicotine filled cartridges may attract more minors than adults.⁶

The following are some research/policy development recommendations:

- a. Network with other states that are or are planning to take aggressive initiatives against e-cigarette usage, for example, state of Washington, New York, Pennsylvania, and other states. E-cigarettes should be removed from the market until their safety is established by FDA.
- b. Health care providers should encourage people who smoke and want to quit smoking to seek nicotine replacement therapies (NRT) or non-nicotine-containing oral medications only with FDA-approved labeling.
- c. Strongly emphasize the dangers of nicotine dependency and toxicity, cardiovascular diseases, and hypertension.
- d. In the absence of reliable research findings and inadequate data to support the therapeutic benefits of e-cigarettes, the use of electronic cigarettes as a smokeless alternative should be discouraged.⁶

REFERENCES

- 1- A high-tech approach to getting a nicotine fix. (2009, April 25). Retrieved February 7, 2011, from <http://articles.latimes.com/2009/apr/25/world/fg-china-cigarettes25>
- 2- 'Electronic cigarettes'. (2010, February 9). Retrieved February 7, 2011, from http://en.wikipedia.org/wiki/Electronic_cigarette
- 3- Vapor King 365 reviews. Retrieved February 8, 2011 from http://www.ecigarettes365.com/vapor_king_510
- 4- Family Smoking Prevention and Tobacco Control Act, HR 1256, 11th Cong, 1st Sess (2009)
- 5- Etter, J.F. (2010).Electronic Cigarettes: a survey of users.BMC Public Health 2010, 10:231
- 6- Wollscheid, K.A., Kremzner, M.E. (2009). Electronic cigarettes: Safety concerns and regulatory issues. Am J Health.Syst Pharm. 2009;66:1740-2
- 7- Yamin, C.K., Bitton A., Bates, D.W. (2010). E-cigarettes: a rapidly growing Internet phenomenon. Ann Intern Med. 2010 Nov 2;153(9):607-9.
- 8- Henningfield, J.E., Zatari, G.S. Electronic nicotine delivery system. Tob Control 2010;19:89-90
- 9- States ban e-cigarettes in face of growing demand (2010, February 24). Retrieved February 8, 2011 from http://floridanewswire.com/2010/02/24/fnw2179_145518.php
- 10- King County Bans Electronic Cigarettes. (2010, December 16). Retrieved February 6, 2011, from <http://www.king5.com/news/King-County-bans-electronic-cigarettes-112036419.html>
- 11- Spokane County banning e-cigarettes for minors. Retrieved February 15, 2011, from <http://www.khq.com/Global/story.asp?S=13997645>
- 12- Use of e-cigs not allowed on U.S. flights. (February 11, 2011). Retrieved March 4, 2011 from <http://www.msnbc.msn.com/id/41530424/#>
- 13- Health Canada Advises Canadians: Not to Use Electronic Cigarettes (2009, March 27). Retrieved February 8, 2011, from www.hc-sc.gc.ca/ahc-asc/media/advisories-avis/_2009/2009_53-eng.php

The following questions are being recommended as an Arkansas e-cigarette survey:

Arkansas E-cigarettes Survey (Questions):

- 1- Do you know what are electronic cigarettes or “e-cigarettes”?
- 2- Do you use e-cigarettes?
- 3- If yes, why did you prefer e-cigarettes vs. regular cigarettes?
- 4- Do you have the knowledge of the dangers of nicotine and nicotine containing products?
- 5- Do you consider e-cigarette a therapeutic or a drug delivery device?
- 6- Do you support a law that would ban e-cigarettes in the state of Arkansas?
- 7- Do you have children living with you in your house?
- 8- What is your gender?
- 9- What is your age?
- 10- What is your race?
- 11- Are you Hispanic/Latino?
- 12- What is your educational level?
- 13- Annual household income?
- 14- What is your county?



Arkansas Department of Health